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ABSTRACT

The purpose of these plans, developed by biology teachers, social studies teachers, and high school students, are: 1) to develop a systematic method of becoming informed on issues not solely based within traditional disciplines; 2) to provide students with an opportunity to help determine the direction and content of their studies; 3) to aid in expanding the traditional view of learning as a classroom activity; and, 4) to redefine teaching-learning roles to allow individual goal setting, self evaluation, and use of community resources. An introduction sets out the general context of ecological study, the assumptions on which the unit is based, and the general purpose of the course. The unit is lab and problem centered, and is built around an issue of the individual student's selection. The course is structured into two separate phases, the second one optional but highly desirable. Possible objectives of the course are listed, the framework of the course is discussed, and several pages show the suggested organizational frameworks in chart form. They include: an interdisciplinary course; a unit within biology or social studies; an interdisciplinary unit taught in both biology and social studies courses. Some ideas are discussed for differentiating between an area of environmental concern and specific envrionmental problems. (JLB)

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Planning for an

ECOLOGY-ACTION UNIT/COURSE

Introduction

These plans and the development of a systematic framework for student activities in relevant local ecological issues are unique in at least two aspects: (1) The planning stages involved a team of a biology and social studies teacher from each high school in the Madison Public School and (2) Students participated with these teams during every stage of development.

The purposes of these plans are:

(1) To develop a systematic method of becoming informed on issues that are not solely based within traditional disciplines.
(2) To provide students with an opportunity to help determine the the direction and content of their individual studies.
(3) To aid the students and teachers in expanding the traditional view of learning as a classroom activity to one of experience accomplished in many places, at many times.
(4) To redefine the role of student and that of teacher so as to allow individual goal setting, self evaluation of progress, and use of community resources, such as parents or outside agencies.

The development of this planning sequence is one step toward developing a feeling among students that these issues studied are not only school problems but community and/or national problems.

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Planning for an Ecological Unit/Course

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INTRODUCTION

An ecosystem may be described as the total physical and biological composition of a given space and the interrelationships of the component parts. Ecology, then, becomes the study of these interrelationships and the impacts that they create upon one another. Any ecosystem contains a variety of relationships. We can say, for example, that spiders eating flies and bacteria assisting digestion in deer are both "natural" aspects of the ecosystems of earth.

At this point, ecology is an innocuous, though no doubt, interesting, subfield of biology. This is what it would remain except that man has continually disturbed the natural system and created problems for himself and other organisms. The human tendency to alter and simplify ecosystems for its own ends threatens the natural structure on which life and order depend.

Conflict is a natural process in any ecosystem. Indeed, it is vital to the successful functioning of such a system. But man has introduced a dimension in this conflict so profound as to endanger multitudes of eco-components, threatening to turn the earth into a sterile and desolate horror. It is because of man's manipulation that ecological and environmental studies have assumed the significance that they have today.

What kind of environment is desirable and practical? What actions must be taken to preserve the habitat? What behaviors must man alter or eliminate to protect the ecosystem for himself and other species? What practical steps may be taken to insure maintenance of our fragile habitat? These are the kinds of questions that people

should be asking and that students will be requested to reflect upon in this unit/course of study.

At least two major conflicts must be considered here: the conflict between technological man and the natural habitat; and the conflict between technological man and humanistic man. One conflict cannot be successfully resolved without the other. Both must be considered to facilitate action - and action is what each student should take. Without carefully considered commitment and action on the part of individual humans, our present simplistic solutions and stumbling from crisis to crisis will continue. The commitment-action process must be systematic and based on sound ecological values. Processes leading to desirable change and reestablishment of a sound habitat cannot take place otherwise.

The general purpose of this unit/course is to devise a program through which a student may develop skills, attitudes, and knowledge as he becomes an informed, concerned, and functioning citizen of the ecosystem. He should be prepared to participate democratically in environmental problem-solving.

This unit/course is organized around the following assumptions:

1. Every student now has a value system in regard to the environment based upon previous knowledge and experiences.
2. Each student's value system may be modified through confrontation of new data, ideas, and systematic study and involvement.
3. Environmental issues emerge from conflicts in human value systems.
4. This unit/course must be team taught across traditional

lines. A biology teacher and a social studies teacher form the nucleus of such a team, since the expertise of both is necessary. Helpful assistance from fine arts, mathematics, or physical science may add useful dimensions to the program.

5. Because there is no "correct" value system for a student to develop as he considers man's proper relationships with nature, it is vital that the teacher not impose his value system on the class members. Each student should develop a system of his own.

6. One key to a lasting value change at the gut level is involvement. Therefore, the unit/course is lab and problem centered. It is built around an issue of the individual student's selection.

7. Issues selected must be local and experiential. Each student must choose an issue with which he can readily identify and personally observe rather than just read about or pursue at an intellectual level.

8. An uncomplicated structure for step-by-step problem solving, continuous feedback, and continuous organizational planning from the teachers is necessary. This will help the student to know where he is and where he is going.

9. Exposure to the "marketplace" of ideas is vital as each student considers, plans and adjusts attitudes and skills while he progresses through his selected issue. Continuing small group participation with other students working on environmental issues will insure this exposure.

10. Students will bring to class a variety of abilities, skill levels, and levels of sophistication. Individualized work and learning are, then, the key to a successful program. Instructor-led class activities should be minimal and used essentially to explain such things as problem solving techniques and influences acquired and used in American democracy.

1. The unit/course will divide into two separate phases. The details of each phase are included later.
2. Built around a systematic and demanding framework, this unit course allows each student to determine for himself:
   - the environmental issue in which he would like to become involved.
   - what ecological values led to his selection of this issue.
   - how he justifies these values.
   - what change(s) he sees as important to resolving this issue.
   - what alternative courses of action are open.
   - what course of action should be taken.
   - the ramifications of such action.

POSSIBLE OBJECTIVES (revised)

1. Each student will identify an area of environmental concern and define a specific issue within that area for his consideration.
2. Each student will locate, organize, and apply data to this issue as he proceeds through the following steps:
   - identify and record causes for the concern in terms of a) individual human causes; b) institutional causes c) cultural causes; d) natural processes.
   - identify a tentative change to resolve the issue.
   - identify specific ramifications of such change.
   - specify a personal positional statement of desired change to alleviate the issue.
   - examine alternative methods for acquiring resolution of the issue in terms of individual human change, cultural change, institutional change, technological change.
   - design a plan to resolve the issue and implement the desired change.
3. Each student will, by completing objectives 1 and 2, consider man's impact on local ecosystems.

* 4. Each student will actively employ the plan selected in objective 2.

* 5. Each student will, upon completion of the above steps, identify and evaluate the processes employed by him throughout the unit/course.

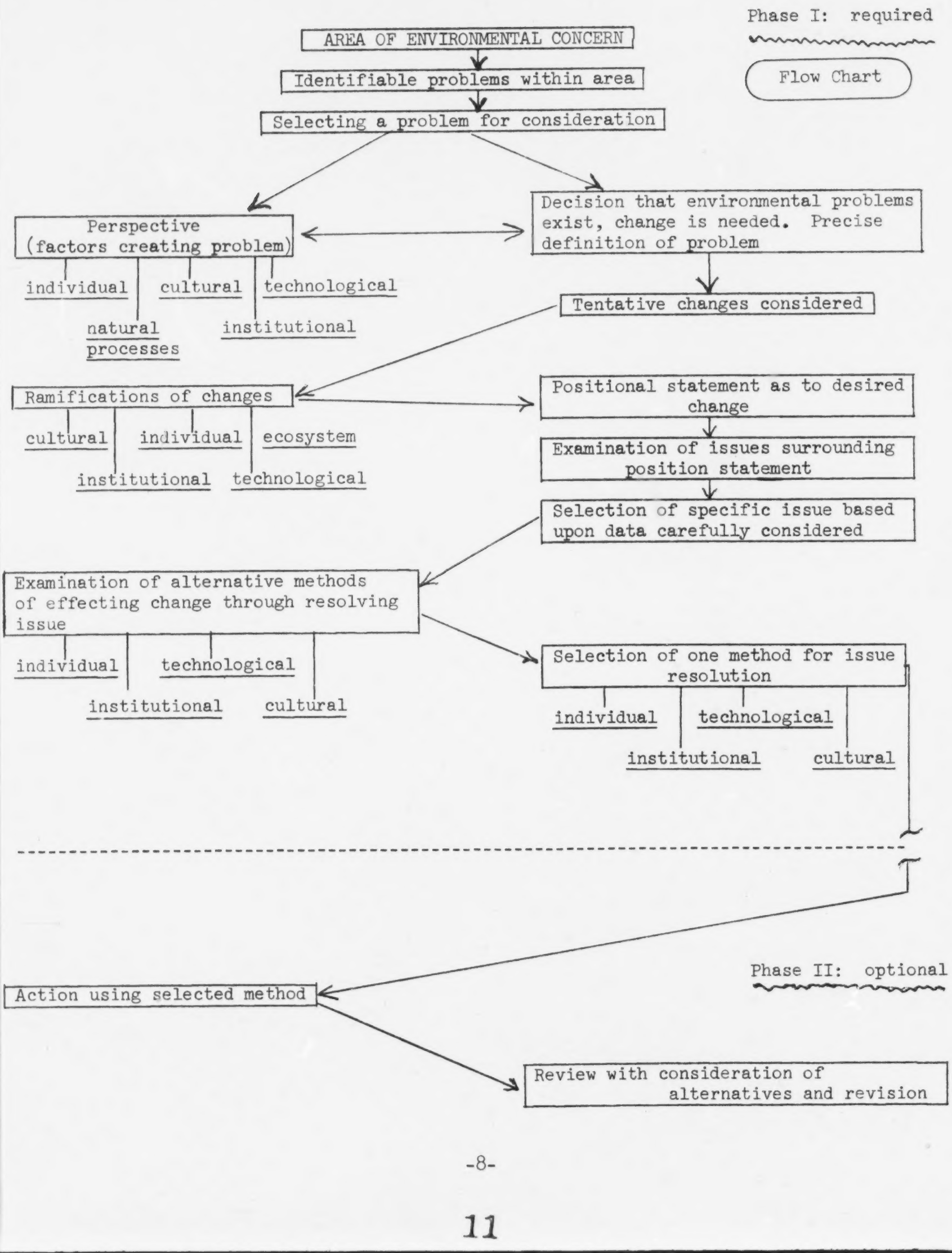
*6. Each student will, on the basis of his evaluation, plan future processes and strategies for his use.

7. Each student will develop a greater awareness of, and appreciation for, ecosystems - their complexity and significance.

8. Each student will develop a position of belief in which he describes those ecological values he subscribes to.

9. Each student will <u>continually</u> review, reevaluate, and revise his attitudes, skills, and actions described in previous objectives in light of new insights and data.

* These objectives are designed for phase II of the unit/course which is optional for the student.


Phase I: required
Flow Chart
AREA OF ENVIRONMENTAL CONCERN
Identifiable problems within area
Selecting a problem for consideration
Perspective (factors creating problem)
individual
cultural
technological
natural processes
institutional
Decision that environmental problems exist, change is needed. Precise definition of problem
Tentative changes considered
Ramifications of changes
cultural
individual
ecosystem
institutional
technological
Positional statement as to desired change
Examination of issues surrounding position statement
Selection of specific issue based upon data carefully considered
Examination of alternative methods of effecting change through resolving issue
individual
technological
institutional
cultural
Selection of one method for issue resolution
individual
technological
institutional
cultural
Phase II: optional
Action using selected method
Review with consideration of alternatives and revision

The Organizational Framework:

A specific organizational framework is suggested for this unit course. In it, four basic learning patterns are indicated: They are:

Type 1 - Student as passive audience in teacher directed activity.

Type 2 - Student working independently with teacher as advisor only.

Type 3 - Student discussion and interaction with teacher as passive moderator.

Type 4 - Laboratory type student interaction with teacher as advisor.

Each type of learning pattern is related to specific activities which are essential to the unit/course. Within the organizational framework, there is an optimum placement for each activity. Careful planning is needed for correct placement.

The primary focus of the unit/course is the issue selected by each individual student. Because of this focus, certain kinds of activities dominate the total program. Certainly, within the organizational framework, types 2, 3, and 4 should play the most significant role.

Several specific kinds of activities are indicated for type 1 in the framework. This is the pattern most frequently used in traditional secondary school courses. In this unit/course, it has all of the strengths and, perhaps more important, the weaknesses of such a pattern. Enough research is now available to indicate that this type of teaching-learning technique becomes ineffectual very

rapidly for most students. Most real and lasting education comes from active participation on the part of the learner.

Because of the shortcomings of teacher directed learning, it should constitute a minimum (perhaps 10%) of the unit/course program. It should be related to the topics selected by students and great care must be employed in selecting a few appropriate environmental and social concepts and issues for presentation. Controversial topics should receive balanced treatment, particularly since you (the teacher) do have the truth.

The following several pages show the suggested organizational framework in chart form. It should prove useful to consider it carefully.

Organizational Framework	Types of Activities	Remarks
Student as passive audience in teacher directed activity.	1. Introduction to unit/course, setting up ground rules, and describing basic format.	Done only at beginning of unit/course.
	2. Introduction to several basic environmental and social concepts related to issues selected by students.	Must pick and choose these carefully, as only a minimal number are to be used.
Type 1	3. Introduction to several general areas of international controversy surrounding environmental ideas and attitudes, such as:	Must be carefully organized to offer several major concerns in a balanced fashion.
	a) various positions on eco-catastrophe.	Only a minimum number should be offered and the program must be balanced between science and social studies.
	b) various aesthetic positions.	
	c) alternative solution positions.	
	d) various moral positions.	
Student working independently with teacher as advisor only.	1. Selecting environmental issue for personal consideration.	Issue selection may be controlled by teacher through a master list if necessary because of limited time, resources, schedule, etc.
Type 2		

Organizational Framework	Types of Activities	Remarks
	2. Gathering and manipulating data from included informational package and/or outside resources.	A continuing activity and the basis of any position or action taken. A "clearing house" is useful at this point. It would function as a centralized request station to order data and materials and prevent unnecessary duplication of effort and burdening of informational sources.
	3. Considering alternatives and developing plans.	A continuing activity which student will develop throughout the unit/course.
	4. Developing personal attitudes, values, and a formalized position on an ecological ethic for governing action.	"
	*5. Taking action to resolve an issue.	An optional culminating activity based upon previous work.

Organizational Framework	Types of Activities	Remarks
Student discussion and interaction with teacher as passive moderator. Type 3	1. Informal discussions between students having different issue interests aimed at: a) sharing of useful information b) reflecting on interrelationships of several problems.	To be used sparingly and with decreasing frequency as unit/ course progresses.
	2. Formal presentations of student positions on different issues. These would indicate progress toward established goals.	Though these would be organized presentations, the other students would react to various aspects and make suggestions for change.
Lab interaction with teacher as advisor Type 4	1. Student discussion with others having similar areas of environmental concern aimed at: a) sharing of useful data and information. b) clarification and modification of direction and position. c) attempting to resolve difficult problems which appear during independent work.	This will make it possible to expand and amplify the various problems within a given area of concern.
	2. Student interaction with teacher aimed at resolving problems discussed in 1 above.	May be done in the form of group work or tutorially.

A Two-Phase Unit/Course

This is to be considered a two-phase unit/course. The first phase involves activities required of all students and the second is optional, though highly desirable. The breakdown is as follows:

Phase I

In this phase, behaviors are developed and evaluated in the classroom. As each student masters the skill and knowledge objectives and reflects upon and establishes an ecological ethic, he is fulfilling the requirements of the unit/course. On the flow chart, all activities up to action are included in phase I. Notice that traditional teaching techniques comprise only a small part of the academic program.

Phase II

Phase II is an optional but logical second step for the unit/course. The student is here expected to act upon his plan. Although some action programs may allow the student to remain in the school building, many will require his attendance elsewhere. The grade level of the student, transportation problems, and the student's "dependability level" are several of the determinants which dictate the desirability and possibility of getting school release for such action. This is the culminating step for the unit/course.

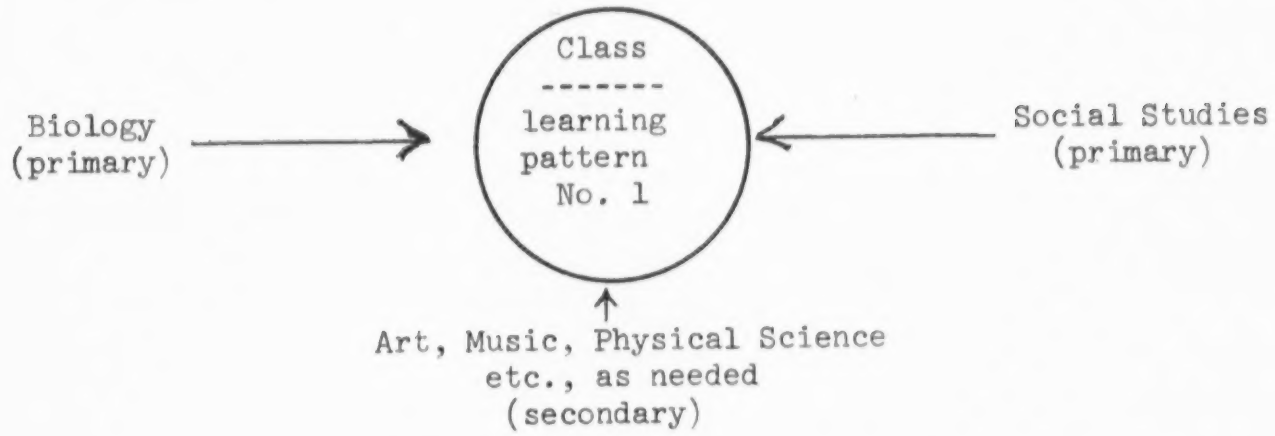
The in-school course work for this phase consists of type 2 and 3 class meetings (perhaps one each per week) in which the student reports progress and failure in his action program. A systematic accounting should be required. In addition, time must be provided at the end for type 3 meetings to review generally the

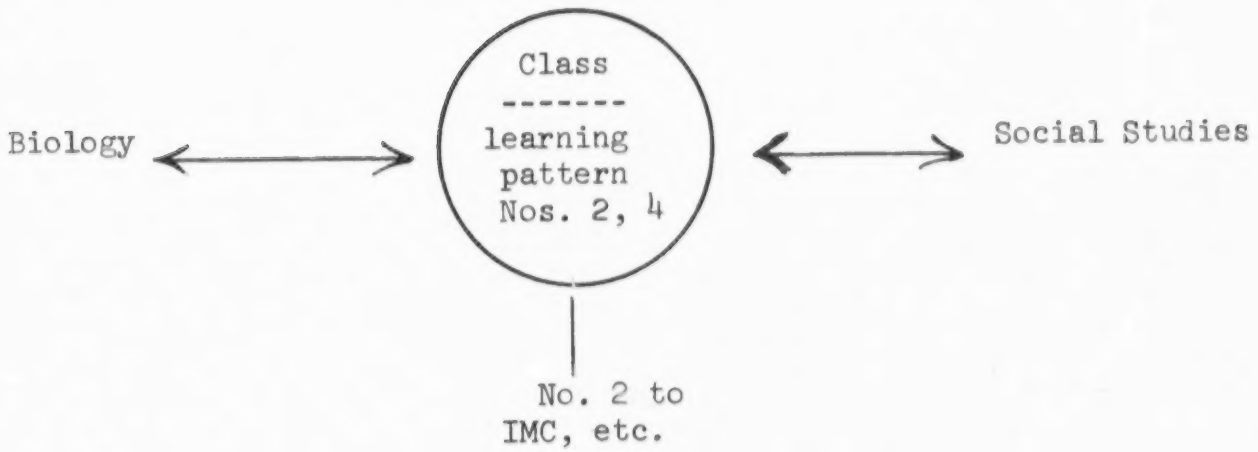
action program, consider alternatives, plan revisions, and formally present findings.

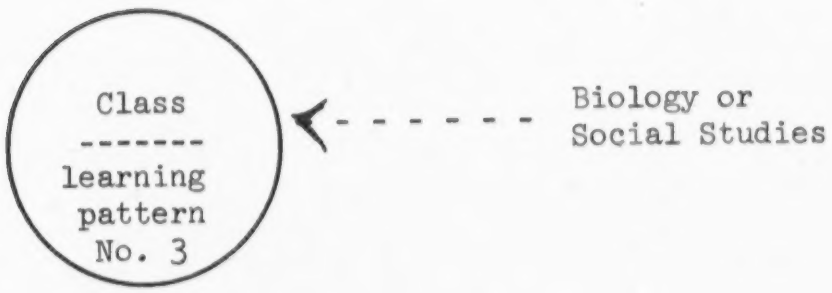
In phase II, the student, then, actually pursues the action necessary in a democratic system. If it is possible to make the necessary allowances, he should be encouraged to participate.

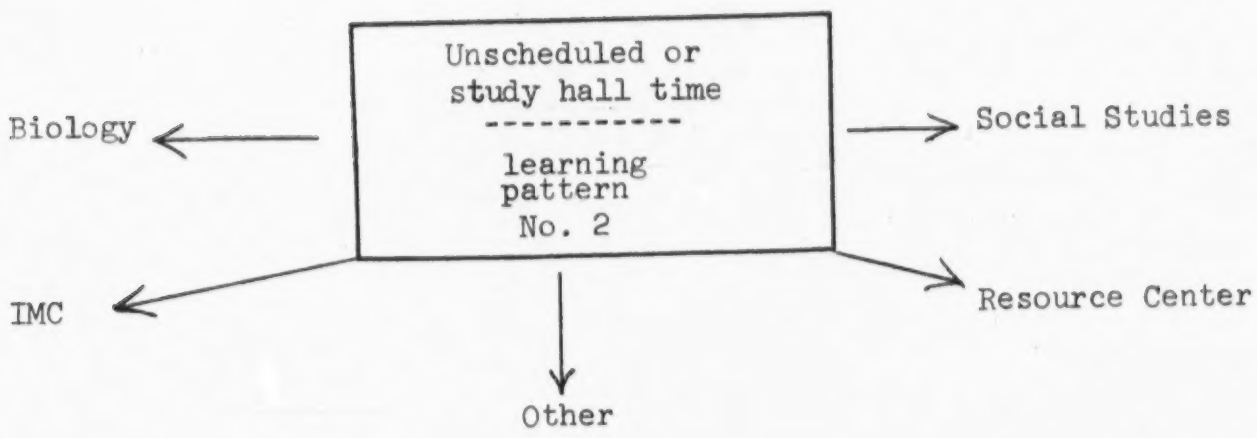
POSSIBLE UNIT/COURSE STRUCTURES FOR PHASE I

Alternative A: An Interdisciplinary Course

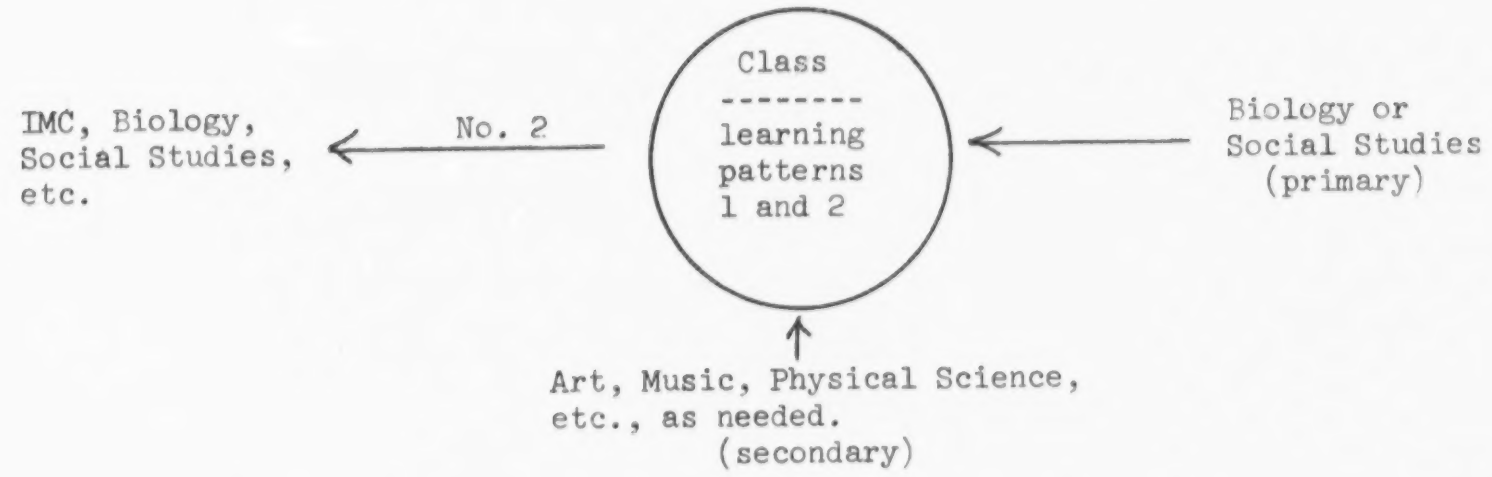




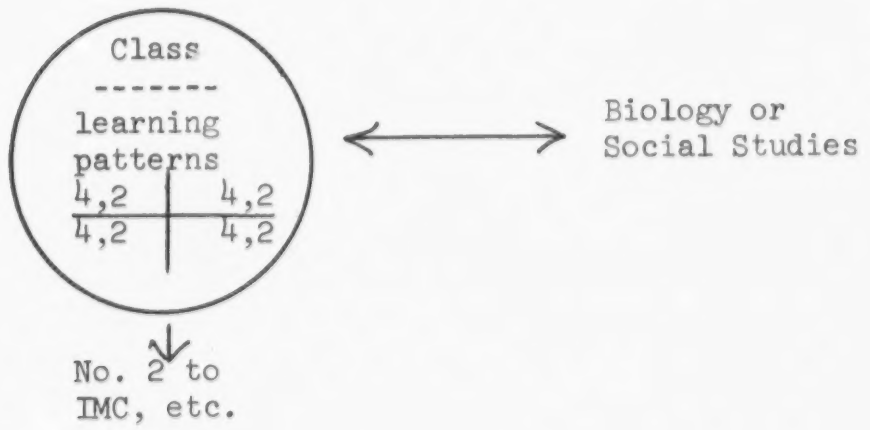


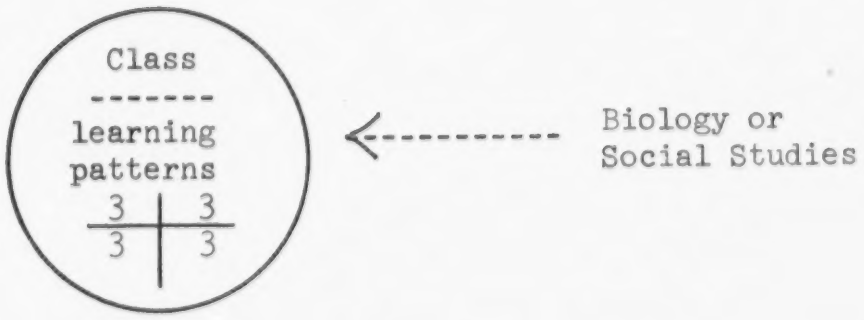


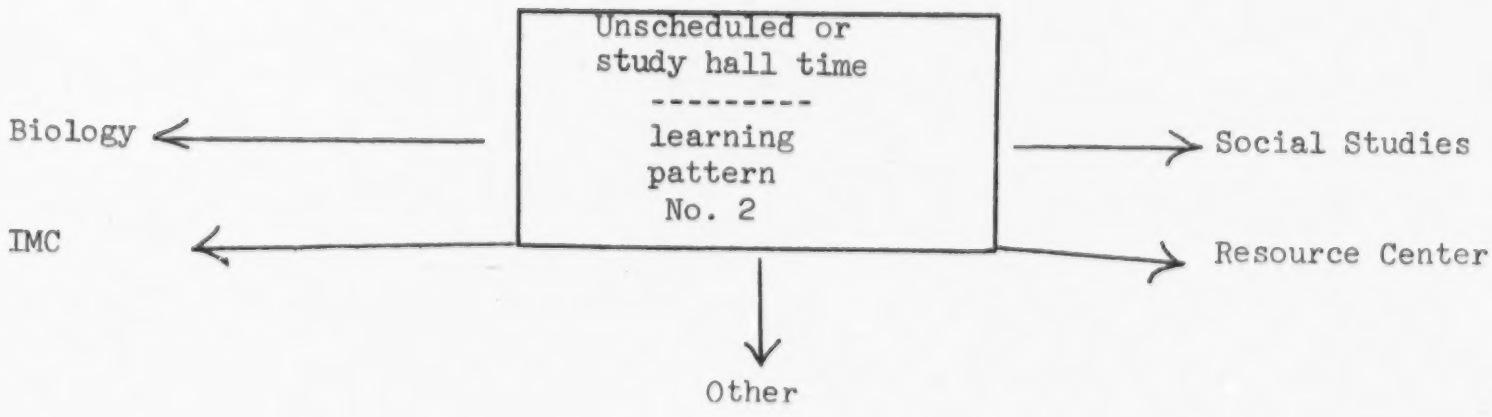
Alternative B: Unit Within Biology or Social Studies Course



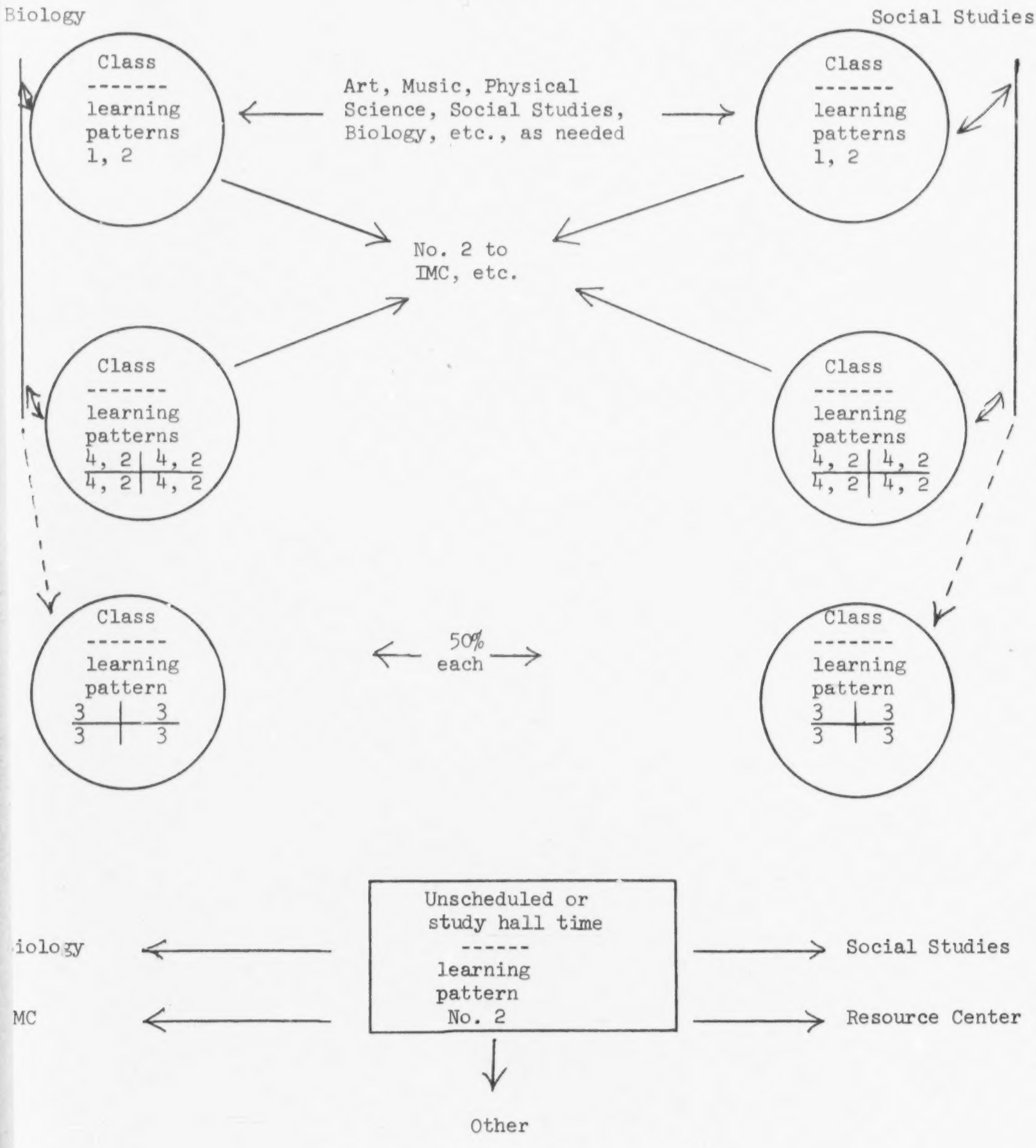
Note: divisions based on number of issues selected and size of class





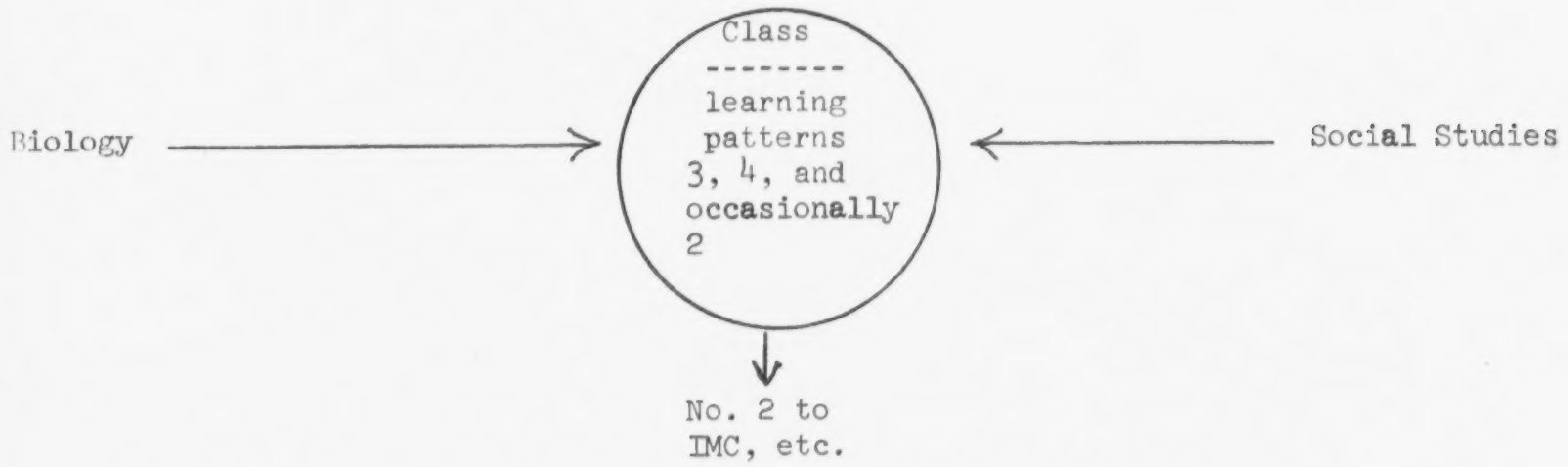


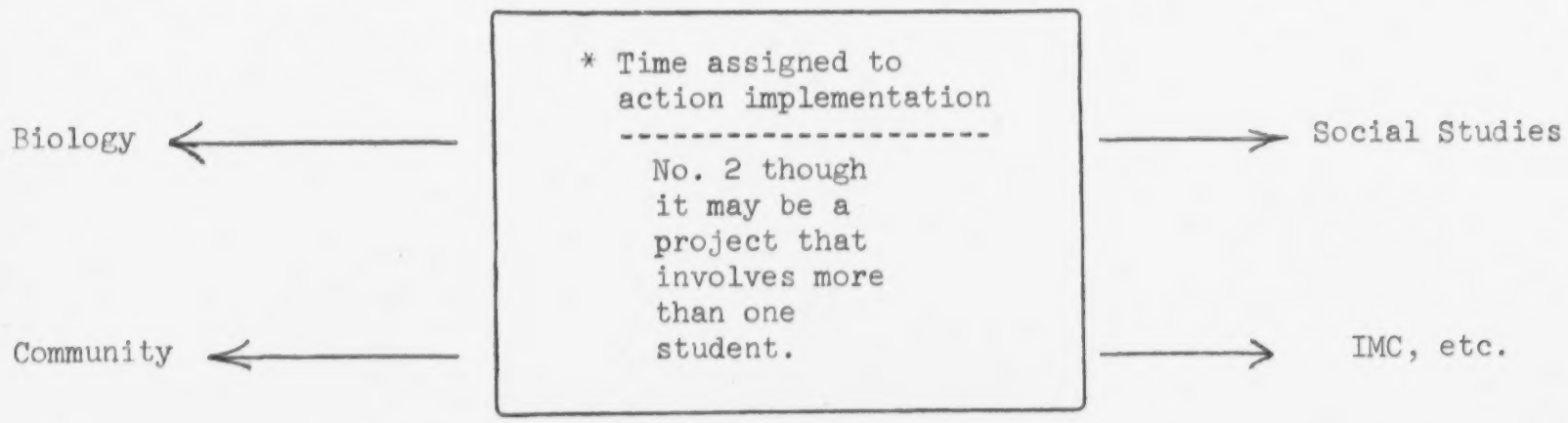
Alternative C: Interdisciplinary Unit Taught in Both Biology and Social Studies Courses



POSSIBLE UNIT/COURSE STRUCTURES FOR PHASE II

Alternative A: An Interdisciplinary Course

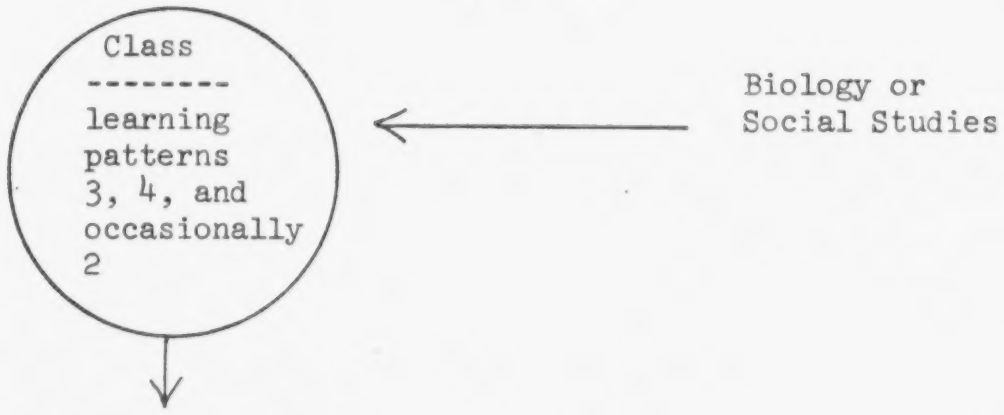


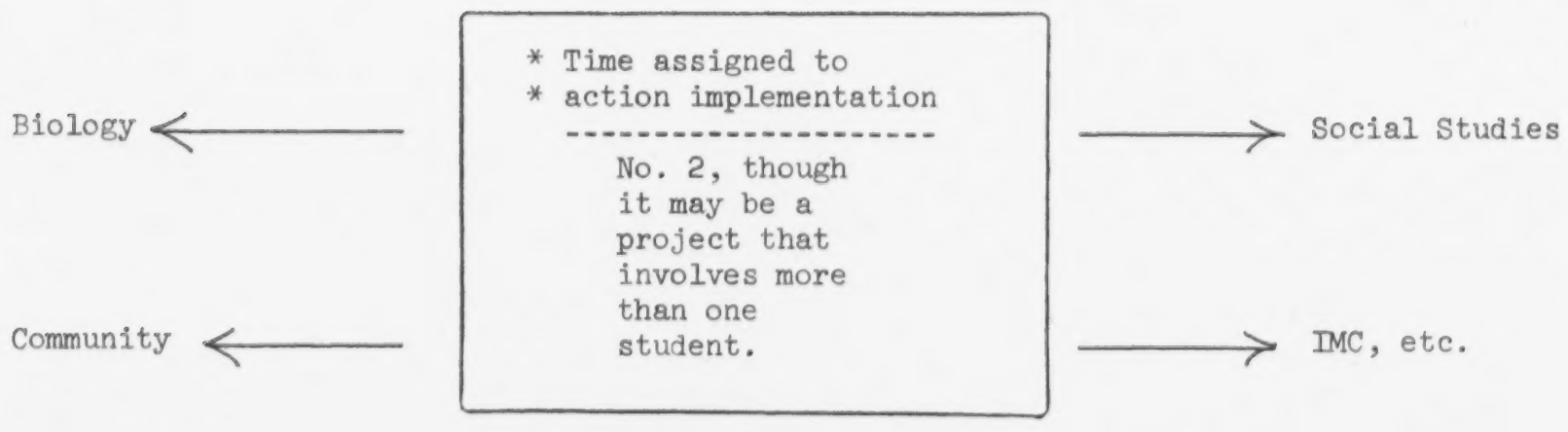

Biology
Community
* Time assigned to action implementation
No. 2 though it may be a project that involves more than one student.
Social Studies
IMC, etc.

*Note: May be school time, evenings, weekends, or some combination of these.

Alternative B: Interdisciplinary Unit or Unit in Biology or Social Studies

Note: This is in addition to "normal" class activities.





* Note: May be study hall or other school time, evenings, weekends, or some combination of these.

Some Organizational Ideas

Differentiating between an area of environmental concern and a specific environmental problem.

Each student will, no doubt, be able to identify some general area of environmental concern. He may, for example, state that water pollution is a serious problem locally and around the world. At this point, he has indicated an area of environmental concern, but it is hardly useful as a manageable topic and cannot be defined as a real issue. (Do you know of anyone in favor of water pollution?) To work on an issue built upon a manageable problem, each student must be required to move several steps from a vague area of environmental concern.

First, he must determine through experience and data that a general problem and resulting issue exists. Let us assume that he feels that Lake Mendota is becoming a sewer and that people have various ideas on what to do about it, why to do it, and how to do it. The student has now taken water pollution and sliced off a more manageable perspective in which to reason. Very broad problems and issues still exist. The student will be unable to build a viable study-action program in a limited amount of time on a topic so large.

Further subdivision is necessary. By considering various aspects of Lake Mendota and its problems, he can eventually work his way down to a reasonable problem and isolate specific issues for his consideration. One example might be - rampant algae and weed growth in the lake and the public controversy surrounding it. Here he has a manageable topic for a study-action program and can systematically proceed to do those things requested on the flow chart in a reasonable amount of time.

Students, like everyone else, do not always see the real problems and issues surrounding a controversial subject. It is easy to make the mistake of taking on an illusionary problem and perceiving non-existent issues that surround it. To avoid this takes time, effort, and systematic study. Students may make many false starts before coming to grips with a real problem-issue situation.

If you have time to allow for this, it is (in itself), a useful learning experience. If you do not, it is advisable to have a list of actual problems and issues which confront your community. There are a multitude of such problems in metropolitan Madison which have limited visibility. Perhaps only a few people are aware of them and they receive very little attention. The Man-Environment Communication Center (MEC Center) has such a list of real and, sometimes, bogus problems which individual citizens have noted. Some examples from this list are included below and the complete list is available from the MEC Center in Madison.

Area of Local Environmental Concern	Specific Problems*
Lakes	1. Trash stench in Starkweather Creek.
	2. Foam and detergent matters on Lakes Wingra and Mendota.
	3. Oil, etc., streaming into Lake Wingra from storm sewers.
	4. Seaweed in the beautiful lakes of Madison.
	5. Detergents causing algae in Madison Lakes.
Solid Waste Disposal	1. Junked automobiles and trash along railroad tracks south of University of Wisconsin, Lot No. 16.
	2. Pond at south end of Acewood Blvd. used as a dump.
	3. Village of Maple Bluff dumps its garbage and solid waste into Cherokee Marsh.
	4. Debris everywhere - Francis Street.
Noise	1. Too much honking of horns on Gilman Street.
	2. Internal factory noise above an acceptable decible level.
Air Pollution	1. Restaurant creating charcoal grill fumes.
	2. Filthy incinerator smoke at C & P Shopping Center.
	3. Burning trash at city dump - Mineral Point Road.
	4. Excessive fumes from old busses.
	5. Auto exhaust, especially from cars badly needing repairs.

Urban Sprawl and Blight

1. Dilapidated houses.
2. Uncontrolled sprawl in Dane County.
3. Large number of apartments.

*Note: This list was compiled from actual comments sent by citizens to the MEC Center. You may note that some of them are imprecise or misrepresent the truth. This still gives some idea of the kinds of things that citizens are concerned about.